Blood Pressure Reprogramming Adapter Assists Signal Recording

The blood pressure signal contains two components that are mixed together in telemetry applications, a dc pressure signal and an ac (36 cps) Korotkoff sounds signal. Most tape recorders are incapable of recording the composite signal on the same channel because of their frequency response limitations.

A blood pressure reprogramming adapter has been designed to separate the two signals so that the Korotkoff sounds are recorded on one channel as received while the dc pressure signal is converted to FM and recorded on a second channel. This circuitry has the advantage over other conversion devices such as rc multivibrators, square loop transformer oscillators, and voltage controlled oscillators, in its inherent linearity and low power drain.

Basically, the circuit consists of a differential dc amplifier that varies the output of a constant current generator that in turn varies the frequency of a unijunction transistor oscillator. Output of the oscillator is fed to a bistable flip-flop that produces a symmetrical output. The first five transistors form a high gain dc amplifier with Q1 acting as a constant current source. Transistors Q2 and Q2A form a matched pair of NPN silicon planar transistors while Q3 and...
Q3A form a matched pair of PNP planar transistors and these are so connected that they provide high current gain and low temperature drift. Capacitors C1 and C2 across R1 and R2 limit the ac gain at 36 cps to approximately L6, which provides adequate signal while preventing interference to the oscillator. Transistor Q4 and capacitor C3 remove the Korotkoff sounds from the pressure ramp and apply them to output 1. Transistor Q3A forms the second stage of the dc amplifier with Q5 acting as its current source. Current in Q3A is set by adjusting R3 with the input shorted. The repetition rate of Q6 is directly proportional to the current in Q3A which, once set, is controlled by the differential voltage at its bases, originally determined by the input voltage. Output from Q6 is in the form of sharp pulses which the tape recorder is unable to handle; consequently, the pulses are used to trigger the bistable flip-flop. Output of the bistable is a symmetrical square wave whose frequency is one half the unijunction oscillator frequency. Resistors R4, R5, R6, and R7 attenuate this signal and provide the correct bias for compatibility with the tape recorder response.

Notes:
1. This circuitry draws only 2 ma from the −10v supply and 1 ma from the +10v supply and is absolutely linear from 10 cps to 100 cps.
2. Inquiries concerning this invention may be directed to:
   Technology Utilization Officer
   Manned Spacecraft Center
   Houston, Texas  77058
   Reference: B67-10475

Patent status:
This invention is owned by NASA, and a patent application has been filed. Royalty-free, nonexclusive licenses for its commercial use will be granted by NASA. Inquiries concerning license rights should be made to NASA, Code GP, Washington, D.C.  20546.

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